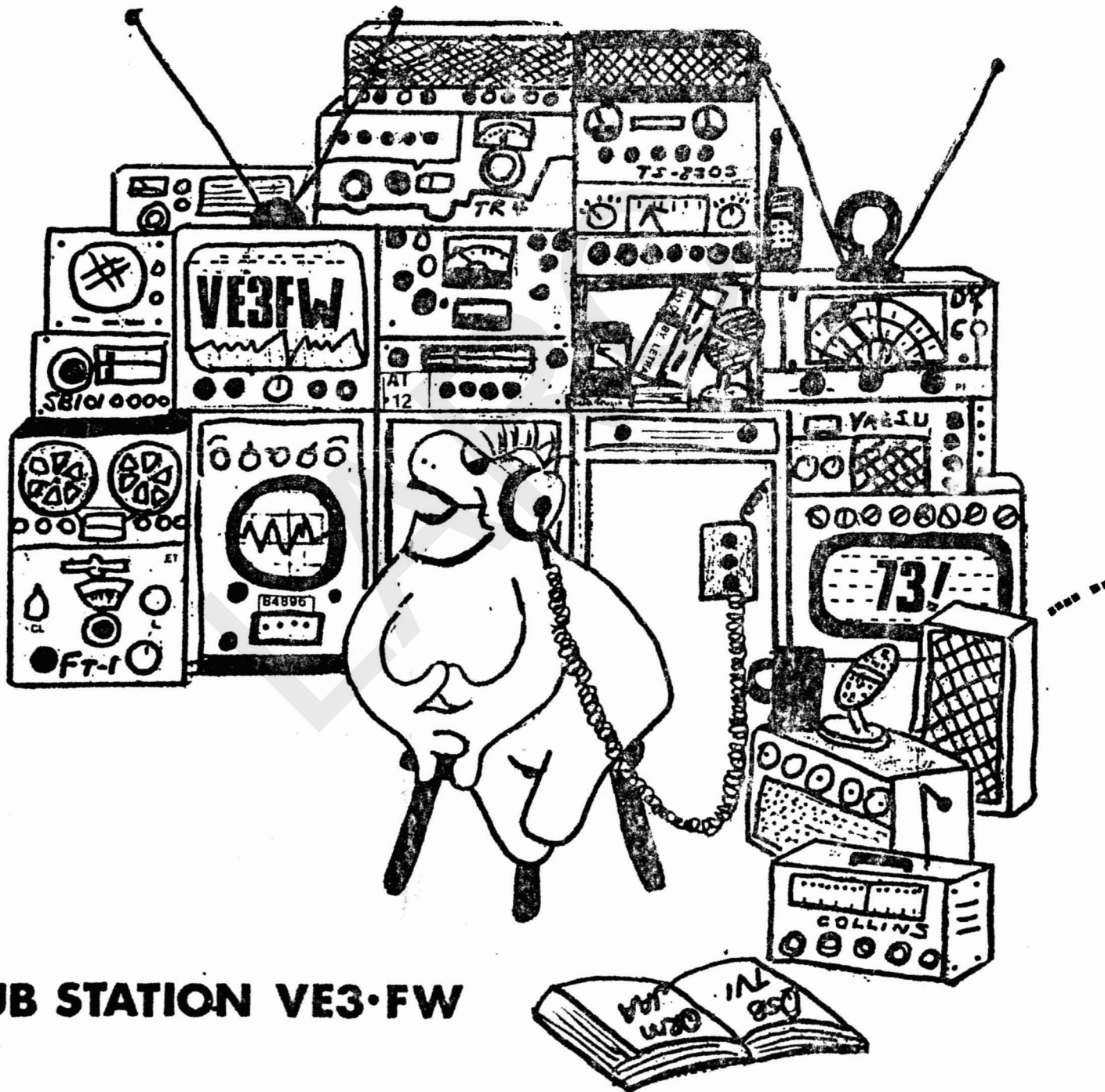


Feb 85

HI-Q

LAKEHEAD AMATEUR RADIO CLUB BULLETIN



CLUB STATION VE3·FW

Founded 1934

Incorporated 1979

Lakehead Amateur Radio Club History Project

LARC

HI-Q FEBRUARY 1985

THE DINNER/DANCE WILL BE HELD AT THE AIRLANE ON FEBRUARY 2, 1985.
NO BUSINESS PORTION IS PLANNED THAT EVENING.

SEE YOU THERE!

THE PREZ SEZ

I thought 1984 went by fast, but the new year is off to a very fast start! I must admit it's nice to see attendance at the meetings up, and to see a few "old-timers" active in Club activities. Here's hoping that 1985 will be our best year ever! Things are sure looking up.

Unfortunately, the Jan. issue of Hi-Q went out a bit late, and was due to circumstances beyond anyone's control--namely the Christmas/New Year holidays. The Feb. issue went out early to coincide with the LARC Annual Dinner/Dance. In March, we should be "back on schedule". As a reminder, there is no meeting on Feb. 14.

There are quite a few activities forthcoming, and volunteers are required. Namely the Sibley Ski Tour, jumping competitions at Big Thunder in March, the Legion 10-Mile Road Race is also coming up. I am also looking for Field Day site suggestions, and a program is required for April, and a tour in May would be nice. Any ideas?

In most of my articles in Hi-Q I am usually looking for volunteers for this, that or the other thing. Ever wonder why? Well, one of the main reasons for Amateur Radio existing today is to provide a service to the public. It also helps us keep our communication skills in tip-top shape, and we have a lot of fun to boot. We also benefit from the public seeing us "do our thing" in terms of PR.

One of my main goals in 1985 is put Amateur Radio and the Club in the limelight, so that we will become a bit better known, along with what we do. I would like to ask everyone, young and old, active or not to help out, and spread the good word about Amateur Radio. Our raffle, along with being a fund raiser has got us off to a good start.

Events like the Sibley Ski Tour, Legion Road Race, etc also help us out with PR, So, when you volunteer your services for an event, you help the club in 2 ways. First, we provide a valuable service. The second is giving us amateurs and the Club some much needed PR.

73 Tom -EEN

DULUTH SWAPFEST

Make plans now to be in Duluth on May 11, 1985! We will include more info about it in the March and April Hi-Q, but this is a pre-warning. Special room rates have been arranged for at the Holiday Inn (downtown), and when you make your reservations, make yours and be sure to mention the Arrowhead Radio Amateur Club for the discount rate.

The Swapfest will be held at the hotel, so you can land your vehicle in the hangar Friday night, and not have to move it till Sunday. On Sunday, several malls are open, so you can attend the Swapfest Saturday, the Banquet Saturday night, and do your shopping on Sunday. Talk in is on W0GKP Repeater--146.34 in 146.94 out. My only closing comment is "party in the penthouse!" See you there.

LAST CALL FOR DINNER/DANCE

Things are slowly falling into place, and hopefully, it will all come together on February 2nd. One of the prizes to be awarded is the infamous "brass doorknob". The recipient has been selected, and they have indicated they will be present. We also have several nice prizes lined up, including glasses, gift certificates, caps, albums and a calculator! We will be having the buffet dinner, and dancing from 9 to 1. If you still haven't paid up, do so soon. It's going to be a great gathering. See you there!

DEAR LYN:

I just bought a new collins KWM-380 transceiver, but some of the little round thing-a-ma-jigs broke open, and the smoke leaked out. How do I go about recharging them? I took great pains to ensure I was able to capture all the smoke, but I need help with the recharge process.

SIGNED - HOLDING MY BREATH

DEAR HOLDING YOUR BREATH:

You must have a mouth like a vacuum cleaner! How about coming over and cleaning up my QTH? Never mind that for now, but to answer your question, you must do the following--remove the broken part from the radio, then switch yourself into the "blower" mode. Carefully insert the part between your teeth, then re-charge it. Once that is done, then crazy glue it back together, and reinstall it in the radio. What could be simpler?

de LYN YEAR

SIBLEY SKI TOUR

The Annual Sibley Ski Tour will be held on Saturday, March 2nd. Several people have volunteered already, but we still need a few more. The final details are still being worked out, but 8-10 people are needed. As I mentioned last month, I will be working that weekend, and if someone would like to act as 'on-site' coordinator, please let me know ASAP. I will take care of the rest of it.

73 Tom EEW

LARC RAFFLE

Many thanks to everyone who pitched in to help out with this fund raiser. As of this writing, ticket sales are brisk, and the idea seems to be going over quite well. A summary will be printed in the March Hi-Q to let everyone know how we made out. If you still have unsold or sold tickets, please forward them to Gary HJS or Tom EEW ASAP. All tickets must be in by February 2 for the draw.

Tom EEW

CLUB CALENDAR

Feb. 2	Dinner/Dance - Airplane
Feb. 14	No meeting
Mar. 2	Sibley Ski Tour
Mar. 14	Swap Night - Get your goodies ready
Mar. 30-31	CQWW WPX Contest - Rules in CQ magazine - Jan. issue
Apr. 11	Meeting night - No event planned as of yet--any suggestions?
May 9	Meeting night - Nothing planned yet, but I will look into a tour--where would you like to go?
May 11	Duluth Swapfest
June 13	Meeting Night - Annual Election of Officers as per LARC Constitution
June ? (last weekend)	Field Day - any suggestions where to hold our Field Day festivities?
July-Aug.	LARC Picnic?
Sept. ?	Corn Roast
Sept. 12	Meeting Night - New Offices get to sit up front!

50/50 DRAW

Arnold VE3JAA has suggested that we hold a 50/50 draw at our meetings. It would be something like this. A board would be made up with all Club members names on it. When you come out to the meeting, you would deposit 50¢ into a jar, and put a marker (pin) by your name indicating you have paid. After the meeting, a name is selected at random. If you are present and paid, the proceeds are split between you and the Club. If you are present and decided not to join in, or you are not present and your name is selected, then you don't win. The proceeds stay in the jar, and are added to the following months draw. The name and call of the winner will be published in the following month's Hi-Q. If you would like to help out with making up a suitable display board, please contact Tom EEW.

Tom EEW

DIRTY LAUNDRY

VE3KRV got ripped off! VE3BCD is still digging out from under the pile. VE3NHN is worried about receiving a piece of hardware in Feb--you never know! VE3HJS is minus one 1962 Pontiac quarter panel--oh well, it didn't fit anyway. VE3JAA has the situation under control every morning. VE3JAR is sending smoke signals from EN 48 land. VE3KRD did such a good job last time he timed out the repeater that he got to keep the trophy for 2 years! VE3NHP was impressed with the rotatable log periodic at 160 feet. VE3EEW went searching for the sun. VE3NHN, NHX and IHP are regulars on the late-night night owl net on '82. VE3EEW is working on a 440 Gateway Link. VE3KRP is running a little low on sleep these days.



CQ ALL HAMS

L.A.R.C.^{INC.}

DINNER & DANCE

ON SATURDAY FEBRUARY 2, 1985



- TICKETS \$23. /PERSON
- SYMPOSIUM 6:30
- DINNER 7:30
- DANCE 9 to 1 party sound

THE ANNUAL DINNER IS OPEN TO MEMBERS OF THE
LAKEHEAD AMATEUR RADIO CLUB, AND ALL INTERESTED
PEOPLE OF THE AREA. A SPECIAL INVITATION IS
EXTENDED TO ALL HAMS IN THE DISTRICT. IF YOU
PLAN TO ATTEND, SEND IN YOUR MONEY AND THE
FORM. FOR MORE INFORMATION, CONTACT

TOM, VE3EEW 335 PICADILLY AVE. T. BAY NORTH
OR CALL 767-1453

GARY, VE3HJS 2624 WALNUT ST. T. BAY SOUTH
OR CALL 623-8132

door prizes ~ spot dances ~ awards ~ talk in 146.46/.06

MAIL IN

P.O. BOX 2571
THUNDER BAY, ONTARIO
P7B 5G1

NAME
ADDRESS
NO. IN PARTY.....
PHONE

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VE3BBS(XYL)

TO ALL RADIO AMATEURS:

The Amateur Radio Emergency Service (ARES) is a voluntary organization of licensed radio Amateurs, who have registered their capabilities and equipment for providing emergency communications as a public service to the community. The purpose of the ARES is to furnish communications in the event of natural disaster, when regular communications fail or are inadequate. Sponsored by ARRL, the ARES functions at the local level to meet local communications needs.

The ARES has a long history of public service going back to its formal inception in 1935. Since that time the ARES has responded countless times to communications emergencies.

Experience has proven that radio amateurs respond more capably in time of emergency when practice has been conducted in an organized group. There is no substitute for experience gained BEFORE the need arises.

The ARES in each locality operates under the direction of the Emergency Co-ordinator (EC) whose function is to direct the activities of the ARES to maintain a state of readiness.

I am still seeking local amateurs for ARES Thunder Bay and District. Any one interested in joining please contact me on 2 meters (VE3TBR) or the NW Ontario Net (3750 KHZ-0115Z) or phone me at home 767-2307.

Members registered at present in ARES Thunder Bay are: VE3XJ, VE3XT, VE3ZG, VE3ARN, VE3AYZ, VE3EEW, VE3HJS, VE3JAA, VE3KRP, VE3LMG, VE3NHN.

Those interested in NET frequencies will be interested in the following:

THE ONTARIO PHONE NET.....	3770 KHZ	1900 EST	DAILY
ONTARS "80".....	3755 KHZ	0700-1700 EST	DAILY
NW ONTARIO PHONE NET.....	3750 KHZ	2015 EST	DAILY
MANITOBA PHONE NET (MORNINGS).....	3765 KHZ	0930 EST	DAILY
MANITOBA PHONE NET (EVENINGS).....	3765 KHZ	2000 EST	DAILY
TRANS PROV NET.....	7055 KHZ(USB)	1000-1700 EST	DAILY

BULLETIN STATIONS

NW ONTARIO NET.....	RSO BULLETINS.....	WEDNESDAYS	VE3JJY
	CRRL BULLETINS.....	MONDAYS	VE3BBS

SWAP SHOPS

NW ONTARIO NET	MONDAYS	3750 KHZ	AFTER THE MONDAY NET
MANITOBA PHONE NET	MONDAYS/WEDNESDAYS	3765 KHZ	AFTER THE EVENING NET
ONTARIO SWAP SHOP	SUNDAYS	3770 KHZ	AFTER THE ONTARIO PHONE NET 1930EST

ITEMS FOR SALE OR TRADE

VE3KRP.....HEATHKIT SB101 COMPLETE WITH POWER SUPPLY, REMOTE VFO MANUALS AND SPARE TUBES
80-10 METERS \$350.00

YAESU FT 301-D COMPLETE WITH POWER SUPPLY/SPEAKER (EXTERNAL) AND BASE MIKE
COMPLETE WITH MANUALS, 160-10 METERS \$700.00

VE3HJS GARY HAS HIS COLLINS RIG FOR SALE. OPEN FOR OFFERS. SOME RECEIVE PROBLEMS ON
20 METERS THAT CAN BE FIXED. OPEN FOR OFFERS.

VE3FW 2-15M QUADS. ASKING \$20.00 EACH. CAN BE SEEN AT THE CLUB STATION. CONTACT VE3EEW
UHF PROGRESS LINE. MANUALS. TUBE TYPE GEAR. ALSO AT CLUB STATION. CONTACT VE3EEW
\$20.00

1 TUBE TESTER. MUST BE SEEN TO BE APPRECIATED. \$10.00. CONTACT VE3EEW.

VE3KRK SONY ICF2001 GENERAL COVERAGE RECEIVER. A.M. F.M. AND SIDEBAND. 0-30 MHZ COVERAGE
AC OR BATTERY POWERED. \$275.00 OR OFFERS

NYE VIKING PHONE PATCH. GREAT FOR THE AMATEUR LOOKING TO PROVIDE PHONE PATCH
FACILITIES IN HIS/HER STATION. \$50.00 OR OFFERS

DENTRON ANTENNA TUNER. MODEL 160-10AT. 1KW. \$200.00 OR OFFERS.

1 DRAKE LOW PASS FILTER. GREAT TO GET RID OF THAT TVI PROBLEM. \$20.00 OR OFFERS.

ITEMS THAT YOU HAVE FOR SALE OR TRADE PLEASE CONTACT SKIP VE3BBS AND WE WILL
ENDEAVOR TO HAVE IT LISTED ON THE ONTARIO SWAP SHOP, MANITOBA SWAP SHOP, AND
OUR LOCAL SWAP SHOP ON THE NW ONTARIO NET. ITEMS ARE LISTED FOR 5-6 WEEKS AND
IF NOT ADVISED TO CANCEL OR KEEP LISTED ARE DROPPED FROM THE LIST.

NOTE.....IF YOU WISH TO BECOME A NET CONTROLLER ON THE NW ONTARIO NET PLEASE CONTACT
ME OR VE3JJY, LLOYD IN KENORA AND WE WILL GIVE YOU ALL THE INFORMATION.

Nickel - Cadmium batteries are very popular nowadays, but there is a lot of mis-information floating around regarding their care and feeding. Duanne, VE3NHP has a copy of the General Electric Nickel-Cadmium handbook, and certain sections have been included here for your information. Contact Duanne if you would like to do some more reading on the subject.

3.7 PRECAUTIONS IN THE USE OF NICKEL-CADMIUM BATTERIES

There are some special considerations and precautions that should be followed when using nickel-cadmium batteries. These precautions can be segmented into electrical and physical.

3.7.1 Electrical Precautions

3.7.1.1 Discharging precautions

Single-cell batteries may be completely discharged at will. To the extent possible, it is recommended that steps be taken to limit the frequency of very deep discharge in multi-cell batteries using sealed cells. Because of the slight differences in capacity between cells, one or more cells will run out of energy before the other cells in a multi-cell battery reach zero voltage, causing reverse charging of the lowest capacity cells. General Electric cells can withstand some reverse charge without damaging the cells. Frequent and substantial reverse charging will lead to a build-up of pressure in the cell reversed. This can lead to operation of the safety vent which, when repeated a number of times, will adversely affect battery performance. For this reason it is recommended that the discharge be terminated when the battery voltage reaches a value determined by the application voltage per cell multiplied by (N-1) minus 0.2, where N is the number of cells in the battery.

Multi-cell batteries are occasionally tapped to give two or more voltage levels. This practice is strongly discouraged because the cells that provide energy to both voltage level circuits will be drained at a faster rate than the other cells in the battery. This could lead to cell reversal.

Series discharging of batteries is acceptable provided the batteries are of the same capacity and they are not discharged too deeply. In the normal production of multi-cell batteries, the cells are graded for capacity and then matched to make a battery assembly. Two different batteries may be matched for slightly different capacities and hence a deep discharge could lead to voltage reversal described above.

Parallel discharging is acceptable provided the battery voltage ratings are the same, or reverse current protection is afforded.

3.7.1.2 Charging precautions

Care should be exercised to ensure that the charge current does not exceed the overcharge capability of the battery. For standard cells the overcharge capability is the 0.1C rate; on special quick charge cells the overcharge current capability is generally 0.25C to 0.3C. If the overcharge capability of the cell is exceeded, excess gas pressure will develop and the pressure relief safety vent will

relieve the excess pressure and reseal. If the excess charge current is not terminated, the vent will continue to open and reseal until the cell is dried out and nonfunctional.

Sealed-cell batteries should not be charged from a constant-voltage source that is set at the overcharge battery voltage level. The battery is likely to go into thermal runaway because of the variations in battery charge voltage described in paragraph 4.5. Vented-cell batteries, however, may be charged from a constant voltage source. Sealed cells should not be charged in parallel for the same reasons that they should not be charged from a constant voltage source. If a current-limiting resistor is connected in series with each battery so that the batteries are not truly connected in parallel, and the overcharge current is limited by the resistor to the capability of the batteries, this method of charging is acceptable.

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3.7.1.3 Storage precautions

Nickel-cadmium batteries can be stored in any state of charge for indefinite periods. However, sealed-cell batteries should be in an open-circuit condition when stored. Extended periods (weeks or longer) of storage or inactivity with a short or a load across the terminals may be damaging to sealed-cell batteries.

3.7.2 Physical Precautions

The following is a list of DO NOT'S when using nickel-cadmium cells or batteries:

- A. Do not dispose of batteries in a fire.
- B. Do not attempt to solder directly to a sealed cell because the seal can be damaged by too much heat. Instead, specify cell models with solder tabs affixed during manufacture.
- C. Do not attempt to replace one defective cell in a multi-cell battery of matched cells unless you have equipment to grade the cells and to properly match the replacement cell to the capacity of the other cells in the battery.
- D. Do not lay an uninsulated multi-cell sealed-cell battery assembly on a metal bench or other metal surface because this will probably place a dead short across the cells.
- E. Do not use uninsulated metal tools when working around the connections of a battery. Severe arcing may result when a current path is made between charged cell terminals.
- F. Do not wear rings without wearing gloves when handling charged cells. Severe burns can be realized from shorting a charged cell. Metal watch bands, identification bracelets, and other such jewelry is also dangerous when working around charged cells.
- G. Do not place a charged cell in your pocket. If you have a coin or other metal object in your pocket, the cell may short and produce extreme heat.
- H. In case you get electrolyte on your hands, wash quickly and neutralize with a mild acid such as vinegar.

5.1 CHARGING METHODS FOR SEALED CELLS

5.1.1 General Comments on Charging Sealed Cells

There are a variety of charge methods which are capable of effectively charging nickel-cadmium sealed cells. These methods all accomplish the same end: putting enough energy into the battery to provide the required amount of discharge energy. The methods differ in the time it takes to accomplish the task, the complexity of circuitry used, and the techniques utilized to provide the charging function in a safe and reliable manner. Because of the multitude of sealed-cell applications, special attention is given here to chargers for these cells. There are numerous charge systems which can be used. The following types are discussed here:

- a. Constant current — Slow rate
- b. Constant current — Quick rate
- c. Trickle charge
- d. Fast charge
- e. Constant potential charge

5.1.2 Constant-current Charging — Slow Rate

Constant-current charging is the charging of a cell or battery at a value of current which, essentially, does not change in magnitude from the start of charge (on a discharged cell), throughout the charge, and during a subsequent over-charge.

The maximum charge current which may be used in the constant-current charge method is determined by the cell's overcharge capability. This charge current level is typically some fraction of the nominal capacity of the cell. Standard nickel-cadmium sealed cells can tolerate 0.1C overcharge for extended

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periods of time¹ without damage or serious performance deterioration. Specially constructed cells are also available with higher overcharge current capability. Because the 0.1C overcharge capability is standard and most economical, it is the most commonly used.

Charging at the 0.1C rate – which is a slow charge rate often referred to as “overnight charging” – requires 14 to 16 hours to restore a full charge to a nickel-cadmium sealed cell (or to a battery consisting of a number of sealed cells). However, the 0.1C charge rate has the following advantages:

- a. Permits the use of the lowest cost cells.
- b. Permits the use of smaller and generally more economical chargers than those for higher charge rates.
- c. Minimizes cell temperature rise and internal pressure during overcharge. (In free air, cells charged at the 0.1C rate will generally exhibit a negligible temperature rise.)

These advantages make 0.1C charging the usual choice wherever 14 to 16 hours of recharging time is acceptable for a full recharge of the battery. Chargers designed for slow rate charging are the simplest and lowest cost of all nickel-cadmium battery chargers. Their circuit simplicity often results in high reliability.

Several constant-current charger circuits are presented in paragraph 5.1.4. These circuits are applicable to chargers for both the slow rate charge discussed above and the quick charge rates discussed in paragraph 5.1.3.

5.1.3 Quick Charge — Constant Current

Many applications for nickel-cadmium cells require two or more full discharges per day; other applications demand the equivalent of two, three or more, full discharges in the form of many partial discharges per day. It is obvious that such applications are not feasible if the recharge time required is 14 to 16 hours. One solution to this problem is to use batteries of two or three times the capacity required for each use of the device. However, the penalties of size, weight, and cost of this approach for many applications may be prohibitive.

An alternate solution, and one which has opened up many new applications for nickel-cadmium sealed cells, is the quick-charge cell. This is a cell capable of being recharged in three to five hours instead of the 14 to 16 hours required by standard cells. The quick-charge cell may be recharged by the constant-current method in as little as three to five hours because it is capable of sustaining overcharge at these rates for long periods.

A dramatic benefit of the quick-charge rate is the restoration of partial discharge in a very short time. This is the result of the input of energy at a higher rate, and is also enhanced by the improvement in charge acceptance (see paragraph 4.2) realized at the higher charge rate. This “rapid renewal” capability is extremely useful in applications which use the battery in short, random discharges. The battery is always near full charge and ready for use at any moment.

¹Tests as long as two years in duration indicate essentially no loss in capability when performed at 25°C ambient temperature.

The cell pressure during overcharge at the quick-charge rate, even in the specially-designed quick-charge cells, will usually be higher than that experienced in standard cells during 0.1C charging. The special construction utilizing advances in plate construction and cell design keep the maximum overcharge pressure in the quick-charge cells well below the operating pressure of the safety vent.

The heat generated in overcharge is directly proportional to the energy input. As a consequence, under identical environmental conditions the cell temperature during an overcharge at the quick-charge rate is higher than that exhibited during slow rate charging. Because cell life and reliability are affected by temperature, special care is often required to provide heat sinks, ventilation, or other means to transfer the heat away from the cells. Effective techniques for heat removal will permit maximum utilization of the quick-charge advantages with little sacrifice of the long-life features of nickel-cadmium cells.

The quick charge capability is available in a number of cell sizes and capacities. Many of these special quick charge cell types are capable of quick charge rates up to 0.3C (complete recharge in three to four hours).

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5.1.5 Trickle Charge

The term "trickle charge" identifies a standby charge rate which is just sufficiently high to keep a charged battery fully charged. The trickle rate is too low to efficiently charge a discharged battery. Therefore, the application of a trickle rate is preceded by a charge at a more normal rate which is generally in the quick charge or fast charge range. The trickle charge rate finds application where readiness to serve is desired but the battery is not to be discharged and recharged for months or perhaps for years. The trickle rate is usually set at 0.01C to 0.03C.

Many of the fast chargers designed for sealed cells revert to a lower charge rate after the high rate charge is terminated. In these applications, this lower charge rate is sometimes referred to as the trickle rate even though, in most cases, it is higher than that of a true trickle rate.

5.1.6 Fast Charge Methods

5.1.6.1 General

The term "fast charge rate" is defined as a charge rate of C or greater, where C is the nominal ampere-hour rating of the cell. As an example, the AA cell, model number GCF-500, is rated as a 500 milliampere-hour (mAh) cell. Therefore the C rate for this cell is 500 mA. The term "fast charge" also implies that some means will be provided to terminate the high rate before the cell is allowed to go very far into overcharge, as the nickel-cadmium sealed cell cannot sustain an indefinite overcharge at C or greater charge rates.

Many fast chargers utilize the split-rate charge approach. Split-rate charging is a technique wherein the battery is initially charged at a fast rate. Then, at an appropriate time, generally at or shortly after the cell goes into overcharge, the charging is switched to a slow rate. The slow rate may be 0.1C or even the trickle rate. This slow rate is low enough that the battery can withstand being charged at this rate indefinitely.

Fast charging has the inherent advantage of being able to partially charge a battery in a very short time, often a matter of minutes. For example, "timed charge" and "dump-timed charge" represent commercially feasible methods of charging a cell safely in less than 2 minutes to about 40 percent state of charge. Other fast charge methods currently in use can fully charge a sealed-cell battery in time periods ranging from 10 minutes to about one hour. The fast charge method is ideal for those applications requiring many partial or complete discharges per day.

Fast charging has its disadvantages. The power supply must be sized to provide high charge currents which means increased cost, size, and weight relative to the slow-rate charger. The fast charger also requires some charge control device. In most charger designs the control device is a sensor (voltage, temperature, or pressure) which adds to circuit complexity and cost. See Figure 5-7 for a block diagram of a typical fast charger using the split-rate method. In

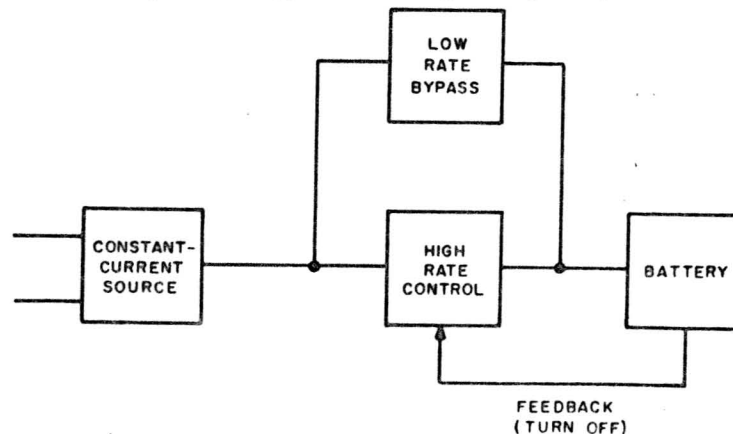


Figure 5-7. Fast Charger Utilizing the Split-rate Method.

addition, fast charging demands an extremely reliable cell pressure relief safety vent. The degree of reliability required can only be achieved by 100 percent

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pretesting of all vents. Therefore, safety would be compromised if fast charge were to be used with button cells and units with "one-shot" vents.

The discussion which follows emphasizes the interrelationship between the voltage, pressure, and temperature characteristics of sealed nickel-cadmium cells. It also covers the various means which can be employed to sense and follow a characteristic as the charging progresses, and then terminate the fast charge rate and switch to a low, safe rate. It will be useful to review some of the parameters and associated characteristics of a nickel-cadmium sealed cell during charge and overcharge. Section 4 shows that during the major portion of the charge time, the internal pressure, the cell case temperature, and the cell voltage increase at a rather low rate. However, as the cell approaches full charge and starts into overcharge, all three parameters begin changing at a greater rate. This increased rate of change of the three cell parameters (voltage, pressure, and temperature) as the cell approaches full charge, is the key to most fast charge control methods. Note that all three parameters, therefore, provide a signal that the time is approaching when the fast charge must be terminated.

It becomes apparent that, with the proper sensing and control devices, a decision can be made as to when to terminate the fast charge on a nickel-cadmium cell. Some fast chargers utilize a voltage reference as the automatic sensor. Other types use a pressure switch or thermostat.

All commonly-used fast charge methods, including voltage, pressure, and temperature cutoff types, are discussed here in detail. All fast chargers operate on the principle that they trade charge rate for charge time. A slow charger rated at 100 mA will charge a 1 Ah cell at its 0.1C rate in 14 hours. The charger transformer must deliver 0.14 watt. It is also possible to fast-charge the same cell in 15 minutes, but the transformer for such a fast charger must deliver 6.0 watts. In addition to the need for a larger rectifier and some type of charge control circuitry, cells with special characteristics and often higher costs are usually required for optimum fast charge performance and reliability. The fast charge capability then costs significantly more than slow charging. However, in some applications, the lower cell costs, which are associated with fast charging smaller cells, may tend to offset the anticipated lower charger cost of charging larger cells on slow charge. In many other applications, the entire feasibility of a viable charger design is dependent on the cell charge characteristics. The charge system (charger and battery) cannot function properly unless the cell provides a signal which is consistent in all important features from one charge to the next throughout its useful life. In addition, the signal from every cell in the battery and from battery to battery must be essentially identical to utilize mass production and random battery/charger interface.

Earlier discussions have cautioned that the nickel-cadmium cell is a complex electrochemical device. Paragraph 4.6 points out the general relationship during charge between cell voltage, cell pressure, and cell temperature. This relationship is not only complex but affected to a significant degree by such seemingly inoffensive variables as ambient temperature and charge rate. (The discussion of chargers, for example, shows how line voltage variations affect charge current output — sometimes quite drastically.) It cannot be emphasized too strongly that this complex interrelationship of cell charging parameters, as well as the

normal inherent cell-to-cell variations in such an electrochemical device, demand that the design of a fast charger be approached cautiously.

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**** W O R D P U Z Z L E ****

compliments of
The Bread Board System, Thunder Bay, Ont
807-622-2685 BBS

LARC WORD PUZZLE

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C W Z X A P L F Z V M C Q K H C H L H Q L N G E J
A K W Y W K K H J E N R E R H H O R O A E F T Z P
Q Q Q A N M R O Q F C G O U M B Z A Z X X A A G W
X U F K T P O P G Q X M L W D V V L X D A C N H B
S M A Q K T R T X Z U I V O Y R E V I E C E R A I
F S P D P E M E R I Q A R I G P G D Z R Z E P P Y
H I S X P S Y E A A X R R H C B H I G A R V V D Z
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F L S L F U E N D E P S F V E T E O P A I P T I S
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V P V I R O O L A A I Z O G G I L B U T N C L P D
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F F R B C L N W A F T N Y Z A D P S A R I G O A M
B H K E S E T Y S A A U U H L C T C E U G P P R H
Z X R Q Y N S T P L Y K O M T S I N L J S H A C K
E P N W T E I S V V M I D G M T L J D W H D E S F
E U U H U B K A O A D A F E R O J R D T B G W Z J
E D I M S S W M B R P Q E E K K C F A H S N G D C
B Q T G X P W E N J G R V B Y K Y P P Y W S Z I G

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FIND THESE HIDDEN WORDS IN THE ABOVE PUZZLE:

amplifier	balun	beam
coax		
communications	contests	dipole
field day		
harmonics	hertz	keyer
logbook		
mast	mobile	morse
paddle		
preamplifier	processor	arp
qsl		
quad	quarterwave	receiver
rig		
rotator	shack	swrbridge
ticket		
tower	transmitter	vertical
wattmeter		
wire	yesi	zepp

LARC

VE3FW PROGRESS REPORT

VE3FW has been undergoing some major renovations lately. VE3's ECV, HJS, KRP, JAQ and EEW built a new operating bench, and removed the wall mounted table. A lot of stuff has also taken up residence at the John St. Landfill site. The old Stewart-Warner Receiver (alias Boat Anchor) was donated to the Thunder Bay Museum. The painters will start Thursday, and the entire room will get a new coat of paint. We are looking for donations of some equipment. If you have some stuff, please refer to the Jan. Hi-Q for a list, and we are also looking for a couch or sofa, fridge, T.V. etc.

Tom EEW

News, weather and the up to the minute details are yours every morning. Just tune in to VE3TBR from 6 AM to 9 AM for the salt mine net every weekday morning. The net is informal, and is fun by Arnold VE3JAA. For the latest info, just check in!

TEN YEARS AGO - FEBRUARY 1975

Ten years ago this month the Annual dinner meeting was held at the Royal Edward Hotel. Two more advanced tickets were obtained by locals as Bill EFC and Brian CUL got the "biggie". Edie VE3HRH got her ticket and was noted as adding a bit of life at the F.D. that year! J.C. Bailey DGZ who passed away a couple of years back had plans to get a SSB rig to tear up 10 meters and Jim EDC (now IY) took the plunge and was wed. A detailed run down on the N.W. Ont phone net was printed in Hi-Q by Les AYZ. VE3EEG and VE3EEW reported that 23 interested people signed up for the Ham class at the college. VE3GHB started new classes at the EMO, and GHB and EDZ combined their resources to get a transmitter and receiver set up at the club (don't look for it today--the editor blew it up--lesson 19--put coax on rig before transmitting!) They even had nostalgia back in '75 as Feb. 1965 was looked back on. Greg HPT was looking for a gen. coverage receiver in the \$75 range, and Bill EEW had some test equipment and other homebrew goodies for sale. It looked like a busy month was had by all